NDCEE

National Defense Center for Energy and Environment

DoD Executive Agent

Office of the Assistant Secretary of the Army (Installations and Environment)

From The Trenches: Top-down and Bottom-up GHG Inventory Approaches

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Presentation Outline

- Why Greenhouse Gas (GHG) Inventories Now?
- GHG Inventory 101 - Protocols, Scope, and Boundaries
- Federal Institutional GHG Inventory Approaches
- Data Collection – What do you have?
- Calculation Approaches and Tools
- Conclusions

Why GHG Inventories Now?

- Executive Order 13423
- Complements goals of Energy Policy Act (EPAct 2005) and Energy Independence and Security Act (EISA 2007)
- *Massachusetts v. EPA* - U.S. Supreme Court (2007)
- EPA's GHG Advance Notice of Proposed Rulemaking (ANPR) or "GHG Rule" (2008)
- New Administration Direction
  - "State of Union" call for GHG Cap and Trade System
  - New GHG Executive Order(s)
- State and Regional GHG Mandates and Activities

New Administration's Direction

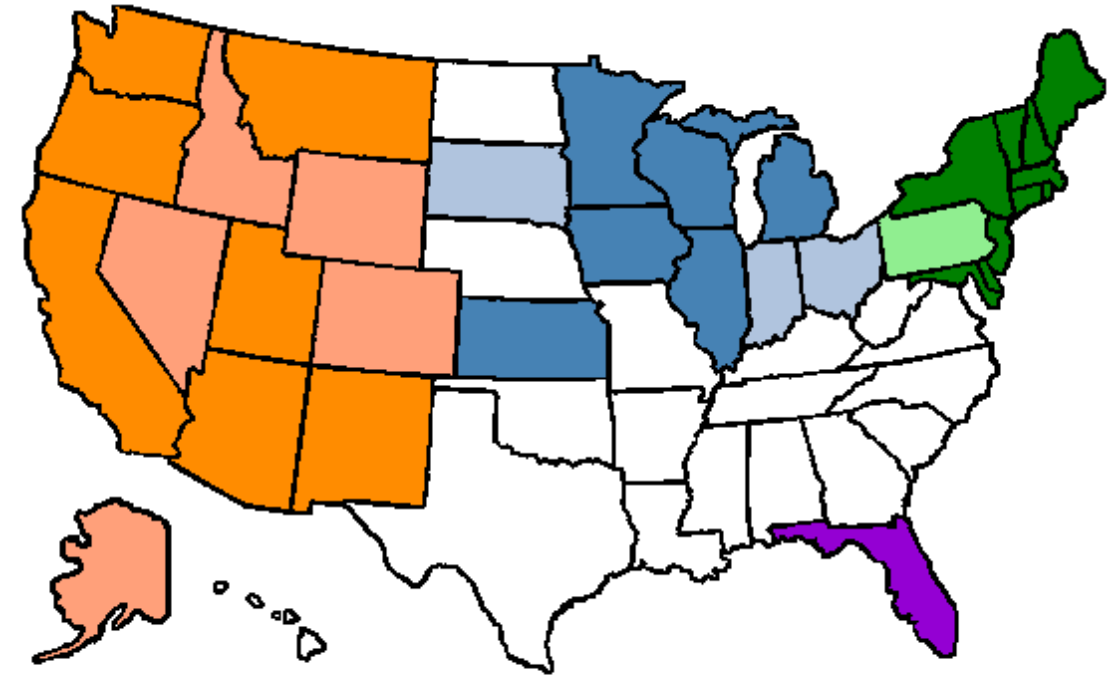
- Obama-Biden New Energy for America plan:
  - Make the U.S. a leader on climate change
  - Implement an economy-wide cap-and-trade program to reduce greenhouse gas emissions 80 percent by 2050
  - Develop and deploy clean coal technology
  - Invest $150 billion over the next ten years to catalyze private efforts to build a clean energy future
  - Ensure 10 percent of US electricity comes from renewable sources by 2012 and 25 percent by 2025 (double alt energy production in 3 years)
  - Establish a national low carbon fuel standard
  - Increase fuel economy standards

Source: www.whitehouse.gov/agenda/energy_and_environment

New GHG Executive Order(s)

- New Executive Order on GHGs anticipated
- Case 1 - Require federal agencies to measure and reduce GHG emissions
  - Reduction requirements likely to be aggressive
  - Base year expected to be 2003
- Case 2 - Require agencies to account for GHGs when performing environmental analyses under NEPA
- National security exemptions?

State and Regional Activity



- Regional Greenhouse Gas Initiative RGGI
- RGGI Observer
- Midwestern Regional GHG Reduction Accord
- MRGHGRA Observer
- Western Climate Initiative
- Western Climate Initiative Observer
- Individual State Cap-and-Trade Program

Source: www.pewclimate.org

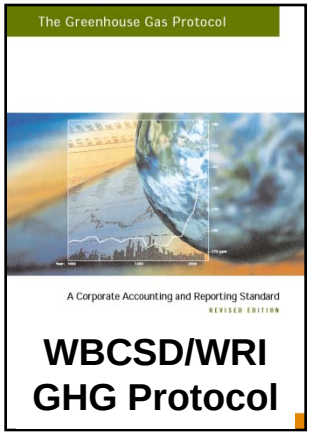
If these drivers aren't reason enough…

- Developing and implementing proactive and thoughtful GHG management strategies helps federal institutions to:
  - Understand their GHG emissions
  - Complement energy security goal achievement
  - Avoid future costs from climate change regulations, risks, and liabilities
  - Reduce costs by linking GHG reduction goals to operational improvement
  - Obtain financial value from climate-related market activities
  - Establish a leadership position

Now the How…Be Thoughtful and Practical

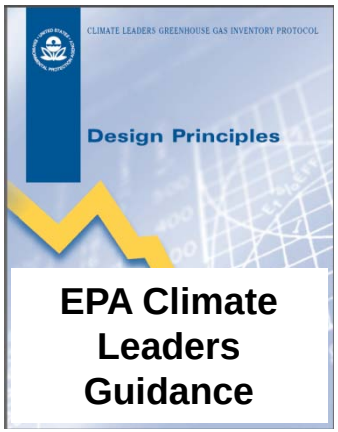
- Which protocol(s) should be used?
- Which institutional approach can be used?
- What data is needed and available?
- Which calculation tool should be used?

GHG Inventory Protocols/Guidance

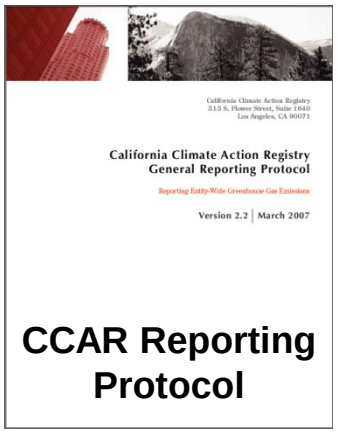


WBCSD/WRI GHG Protocol

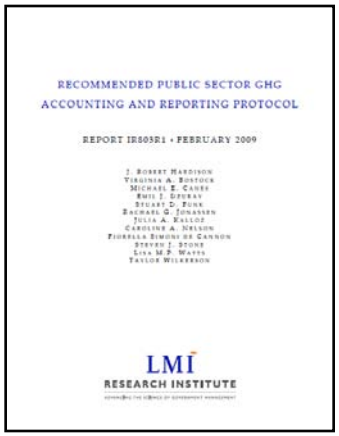
ISO 14064 Standards



EPA Climate Leaders Guidance

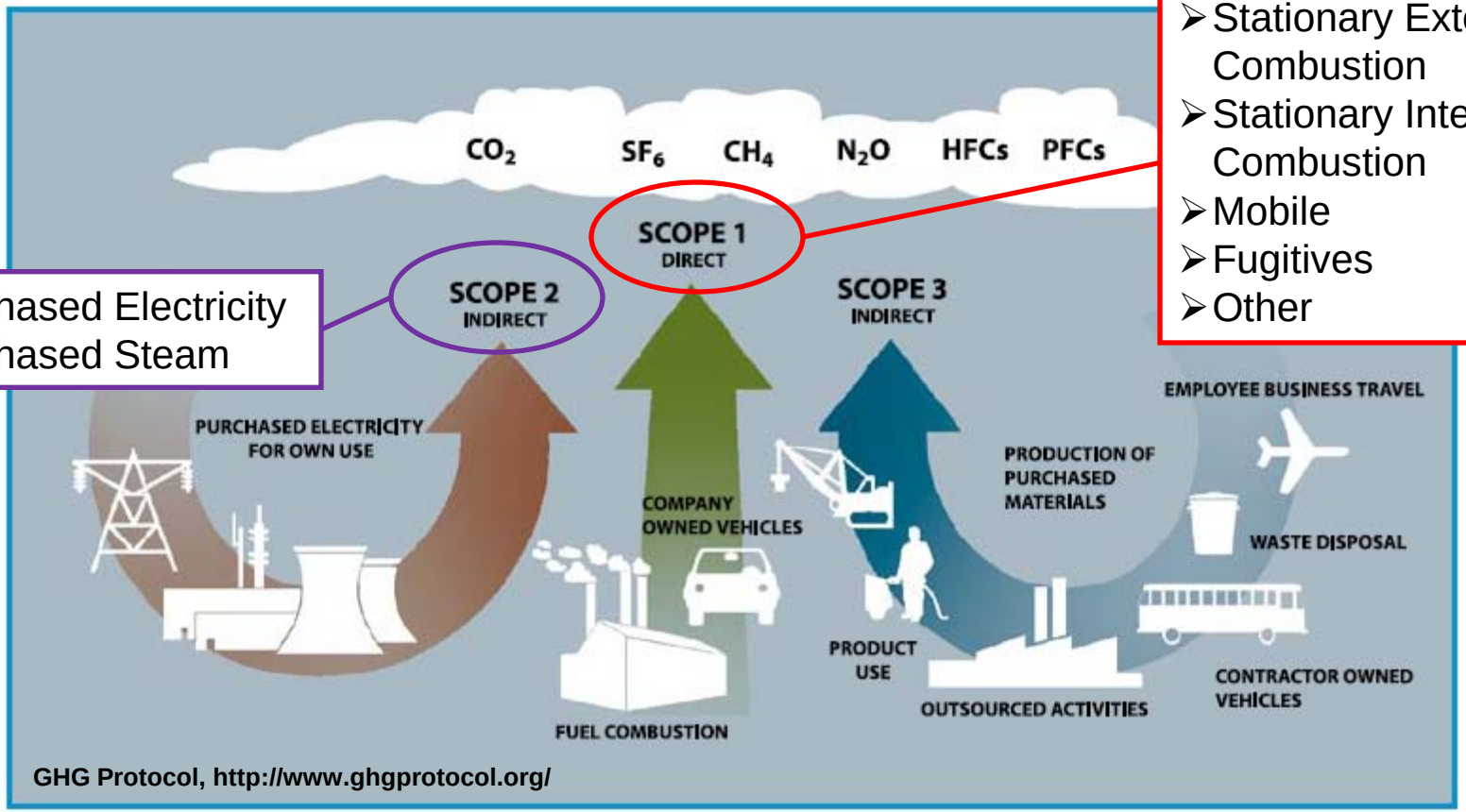


CCAR Reporting Protocol



Installation GHG Emission Sources

- Purchased Electricity
- Purchased Steam

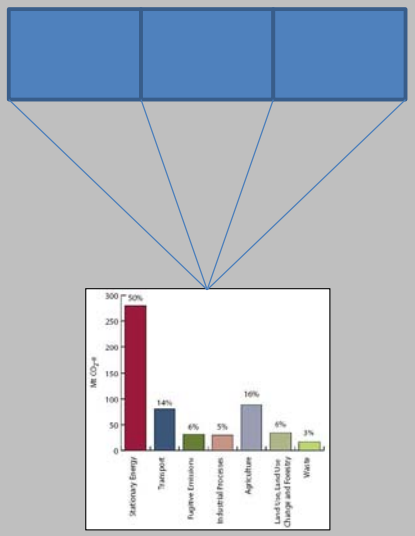


- Stationary External Combustion
- Stationary Internal Combustion
- Mobile
- Fugitives
- Other

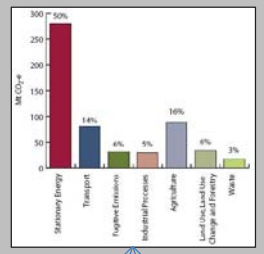
Federal Institutional GHG Approaches

Top-down approach

Existing institutional data systems



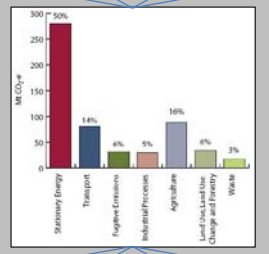
Bottom-up approach



Site/source specific data

Hybrid approach

Existing institutional data systems

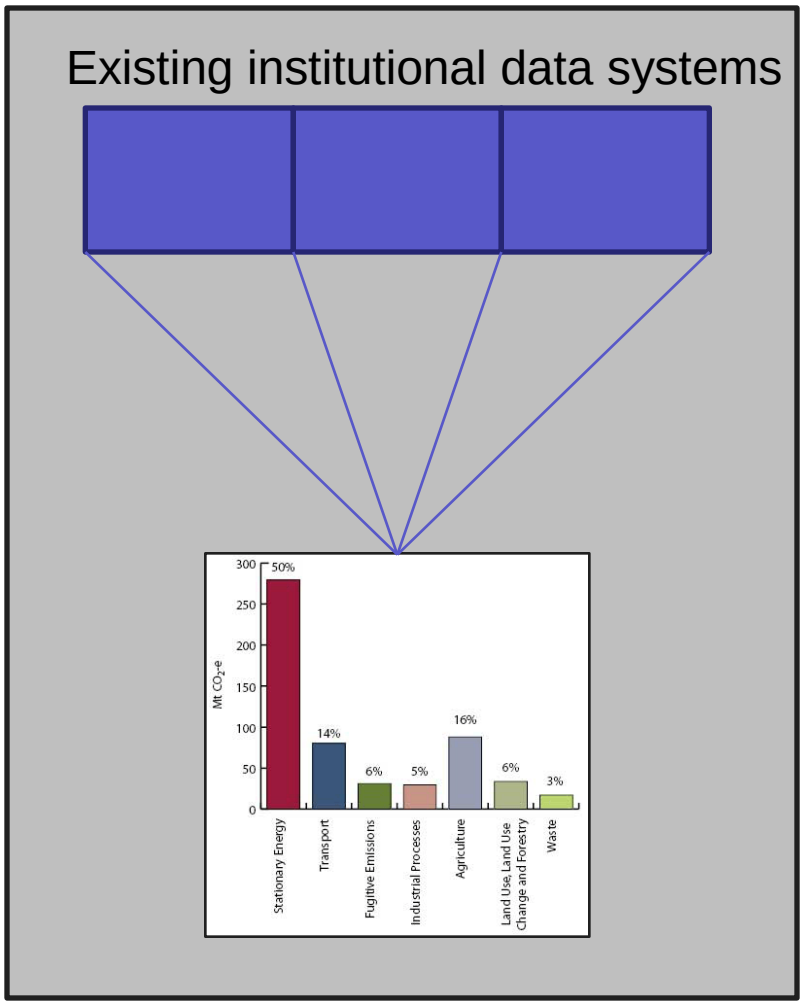


Site/source specific data

Federal Institutional GHG Approaches

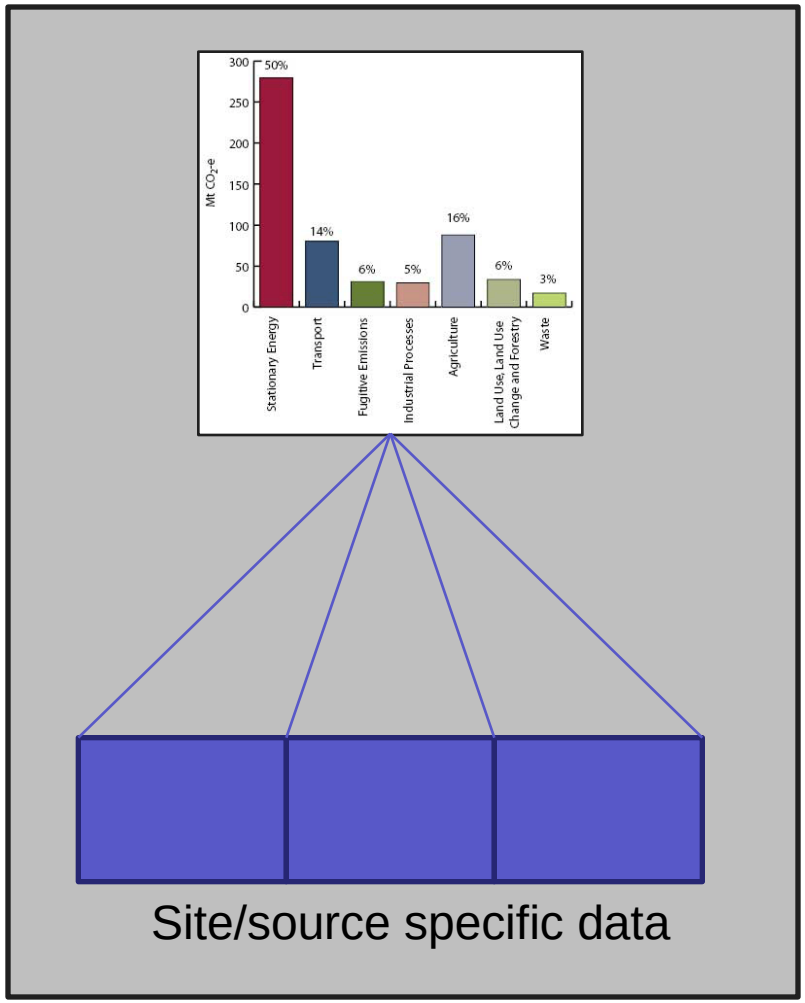
- Top-down
  - Headquarters level approach for facilities
  - Leverage existing institutional data systems
  - Standardized installation calculation templates/profiles
  - Easy to roll-up facility inventories to the headquarters level
- Bottom-up
  - Installation lead and/or close cooperation
  - Utilize detailed site-specific data and knowledge
  - Customized installation calculation templates/profiles
  - Manual rollup or aggregation of results to headquarters level
- Hybrid in future?
  - Approach that meets in the middle

Top-down GHG Inventory Approach



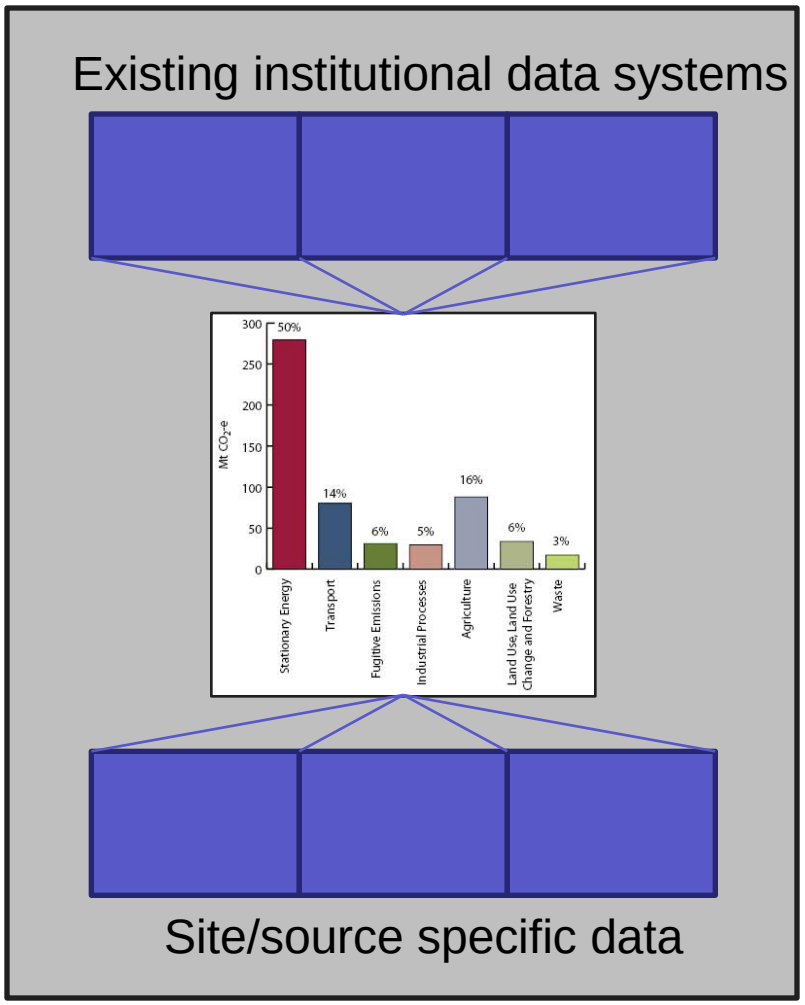
- Current Efforts
  - AEC
  - NASA HQ EMD
  - USAF APIMS
- Advantages
  - Leverage existing data systems
  - Consistent template approach
  - Rapid installation results
  - Easy agency-wide rollup totals
- Disadvantages
  - Scope uncertainties
  - Omitted emission source data
  - Limited ability to meet emerging regulatory requirements
    - Cap-and-Trade Regimes

Bottom-up GHG Inventory Approaches



- Current Efforts
  - DASA (ESOH) and NDCEE
  - NASA GSFC (CY2007)
- Advantages
  - Well-defined boundaries
  - Higher resolution and detailed data
  - Reveal data and EF gaps
  - Identify complementary energy program opportunities
  - Meet state regulatory requirements
- Disadvantages
  - Time consuming
  - Complex boundary issues
  - Difficult to roll-up to HQ level

Hybrid GHG Inventory Approaches



- Current Efforts
  - NASA GSFC
  - Others?
- Advantages
  - Better-defined boundaries
  - Higher resolution and detailed data
  - Reveals data and EF gaps
  - Meets state regulatory and emerging federal requirements
- Disadvantages
  - Time consuming
  - CY vs. FY challenges
  - Complex data reconciliation

Choosing the GHG Approach

- Top-down
  - Utility for agency-level GHG inventory results, their analysis, and strategic decision-making on mitigations
  - Strategic planning and energy investment
- Bottom-up
  - Better suited for faster state regulatory compliance
  - Energy, environmental, and sustainability opportunity assessment utility
- Hybrid
  - Best of both worlds
  - Meets multiple current and future requirements

GHG Inventory Data Collection

- Utility/Energy Data
  - Purchased heating fuel (e.g., natural gas, fuel oil, etc.)
  - Purchased electricity
  - Purchased steam
- Current CAA Air Emissions Inventory (AEI) Calculations and Documents
  - Permitted emissions sources
  - Munitions use and open burn/open detonation (OB/OD)
- Mobile Source Data
  - GSA/DPW vehicles
  - Fuel use
- Prescribed Burn Data
  - Acres burned
- Refrigerant use/other fugitives (non-Ozone Depleting Substances)
  - Refrigerants and chemicals
  - Wastewater treatment and landfill gas

Calculation Approach and Tools

- Depends on institutional goals and budget
- Spreadsheet tool, enterprise-wide EMIS, etc.
- Flexibility required to adapt to dynamic regulatory environment
- Modular setup required to handle diverse emissions sources
- Transparency required for audits, recalculations, etc.
- Consistency required for installation and component rollup
- Design and plan for future third party audit

Conclusions

- Goal is thoughtful GHG Management as Force Multiplier!
- Decide on bottom-up and/or top-down inventory approach to maximize utility and inform decision making
  - Top-down for strategic planning and energy investments
  - Bottom-up for regulatory compliance and opportunity assessment
- Process quickly identifies what you don't know and need to
- Analyze results to identify GHG reduction opportunities and support energy, transportation, and environmental goals

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